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Short Communication

Prevalence of diabetes type-2 & pulmonary tuberculosis among Filipino and treatment outcomes: A surveillance study in the Eastern Saudi Arabia

Liaqat Ali Chaudhry [a,*], *Ebtesam Ba Essa* [b], *Shehab Al-Solaiman* [b], *Kamellia Al-Sindi* [b]

[a] *Dept. of Medicine & Chest Diseases, Dammam Medical Complex (MOH), P.O. Box 132, Dammam 31411, Saudi Arabia*
[b] *Dept. of Medicine, Dammam Medical Complex (MOH), Saudi Arabia*

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ABSTRACT

Objective: To study prevalence of diabetes type-2 and pulmonary tuberculosis among Filipino patients and treatment out comes. Tuberculosis centre of Dammam medical complex (MOH) is a referral centre for the Eastern Saudi Arabia where patients from all government and private hospitals having open pulmonary tuberculosis are admitted for isolation till they are rendered noninfectious. All patients are treated for 6 months under DOTS strategy with 4 drugs (2HRZE) for 2 months as initial intensive phase and 2 drugs (HR) for 4 months as continuation phase.

Methods and materials: We retrospectively reviewed clinical records of 1388 patients admitted with open pulmonary tuberculosis between Jan- 2003 and June-2010.

Results: Among 1388 patients, 39% ($n = 542$) were Saudis and 61% ($n = 846$) were non-Saudis. Among these 12.39% ($n = 172$) were Filipinos,153 males and 19 females respectively. Out of 1388 patients, 114 (7.17%) were found to have diabetes type-2. Among these diabetics, majority $n = 91$ (79.82%) were Filipinos. Sputum conversion was late in diabetic patients resulting in relatively longer hospital stay compared to fellow patients having only tuberculosis.

Conclusion: Our study has shown that one possible risk factor for tuberculosis is diabetes. Majority of TB patients having diabetes type-2, $n = 91$ (79.82%) were Filipinos. Their sputum conversion was relatively late and their hospital stay was longer than their fellow patients having only tuberculosis. Our findings are in agreement with the current literature on the correlation of diabetes and tuberculosis.

Introduction

In view of accumulating evidence, it is a very well-established fact that there is a correlation between diabetes mellitus type-2 and tuberculosis (TB). Patients with diabetes mellitus type-2 are in particular more prone to getting infections, including TB, which are more difficult to treat because of their inherent weak immune system; the high prevalence of diabetes could adversely affect global TB control efforts [1,2].

* Corresponding author. Present address: SBAH-city Rehabilitation Hospital & Medical Centre, P.O. Box 64399, Riyadh 11536, Saudi Arabia. Mobile: +966 509949470.
E-mail address: dr_liaqatali@hotmail.com (L.A. Chaudhry).

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According to the World Health Organization (WHO) 180 million people are suffering from diabetes worldwide, and it is likely to double in the next 19–20 years, i.e., by 2030. Being that TB is an air-born infectious disease that transmits from person to person, each index case of TB can infect on average 10 persons in a year. That is why it is said 'cure of one is safety of ten'. It is predicted that millions of the world population will develop diabetes by 2030, especially in countries that are endemic for TB [3,4]. The countries like China and India with large populations and low to middle incomes have the highest number of TB patients and are facing a rapid increase in the number of diabetic patients as well. Since the risk of developing TB is more likely in diabetic patients, this correlation between diabetes and TB could have a negative impact on TB control programs [5–7].

In this study, the prevalence of diabetes and its correlation with TB among Filipino patients admitted at the TB center between January 2003 and June 2010 and their treatment outcome in terms of sputum conversion and their hospital stay were evaluated retrospectively. All patients were started with initial intensive phase therapy with the standard first-line four-drug combination based on their body weight (Isoniazid [INH] 5 mg /kg, Rifampicin [Rifadin] 10 mg /kg, Ethambutol 15 mg /kg, Pyrazinamide 25 mg /kg). This is a referral center for the Eastern region of Saudi Arabia where patients presenting with open pulmonary tuberculosis are admitted from all government and private hospitals until they are rendered non-infectious by DOTS (directly observed therapy) strategy.

Materials and methods

Clinical records of all 1388 patients admitted during the period between January 2003 and June 2010 were retrieved to detect the number of patients with diabetes and TB. Since the majority (79.82%) of diabetics was Filipinos, their response to anti-TB treatment and their hospital stay was studied when compared with those with only pulmonary TB.

Table 1 – Admissions at Tuberculosis Centre of Dammam Medical Complex (MOH) between January 2003 and June 2010.

Patient's Origin	Number of TB patients	Percentage	TB + diabetics
Saudi	542	39	15
Other non-Saudi	674	48.61	8
Number of Filipinos	172	12.39	91 (79.82%)
Total	1388		114 (7.17%)

Results

Among the total of 1388 patients, 39% ($n = 542$) were Saudis and 61% ($n = 846$) were non-Saudis. Filipinos alone constituted 12.39% of total admissions and 20.3% of non-Saudis. The total number of TB patients also diagnosed with diabetes was 114 (7.17%). Among these diabetics, 79.82% ($n = 91$) were Filipinos. Among the total of 172 Filipinos, 153 were males and 19 were females. Among the 172 Filipinos, the majority (53%, $n = 91$) also had type-2 diabetes, and their age ranged between 32 and 57 years old. All of those Filipinos with diabetes were males; none of the 19 females had diabetes (see Table 1).

Diabetic control was poor at the time of admission; their fasting blood sugar (FBS) ranged between 154 and 230 mg/dL. Glycated hemoglobin (HbA1c) was performed on only 11 patients and ranged between 7.8% and 9.3%, which again indicates chronic hyperglycemia. Those with both TB and diabetes stayed longer in the hospital 70–110 days owing to their late sputum conversion on direct smear when compared with their fellow non-diabetic TB patients 55–90 days (see Table 2).

Discussion

There is a correlation between diabetes mellitus type-2 and TB, mainly because patients with diabetes type-2 have a weak immune system and are therefore more prone to getting infections, including TB. Global TB control efforts could be adversely affected by a high prevalence of diabetes [8–12].

Each year, about 8.8 million people develop active tuberculosis, which commonly affects lungs, and millions of people die because of this highly contagious infection. It is said that one third of the world population is infected with *Mycobacterium tuberculosis*, but all of those infected do not develop active TB because normally the immune system contains the infection. However, in some people the bacteria remain dormant and could become active causing disease at a later stage, especially in those with risk factors such as old age, diabetes, those on immunosuppressive treatments, and HIV patients [13–16].

According to some surveys taken in the Philippines, a high prevalence of diabetes among Filipinos, especially those living

Table 2 – Findings in 172 TB patients of Filipino origin.

	Without type-2 diabetes	With type-2 diabetes
Number of patients	81 {62 males & 19 females}	91 males
Percentage	47	53
Age (years)	26–57 yrs	32–57 yrs
Fasting blood glucose (mg/dL)	Normal	154–230
HbA1c (%)		7.8–9.3
		11 patients
Duration of hospital stay (days)	55–90	70–110

in urban areas, has been reported. About half of these patients were newly diagnosed [17].

A few other studies have also suggested that the incidence and prevalence of diabetes—especially type-2 diabetes—is higher in Filipinos [18–20]. Various population groups in the United States of America have different prevalence rates depending on ethnicity, migrants or non-migrants, and those living in rural and urban areas. Filipinos are the highest immigrant group in the USA, and Filipino-American men, especially those who are obese, have the highest prevalence of diabetes type-2 [21–27].

A systemic review and meta-analysis in the USA of 13 observational studies by Christie Y. Jeon and Megan B. Murray (including more than 17,000 TB patients) showed that those with diabetes had a threefold increased risk of developing active TB when compared with non-diabetics.

The majority 53% ($n = 91$) of Filipino male patients admitted with open pulmonary TB also had uncontrolled diabetes type-2. Their fasting blood sugar levels ranged from 154 to 230. Glycated hemoglobin (Hb-A1c) was performed on only 11 patients, and the results ranged from 7.8% to 9.3%. This indicates that chronic high blood sugar increases the chances of developing active TB.

Diabetics are not only more prone to contracting TB, but their response to initial intensive phase 4-drug anti-TB treatment is slow as well. This was clearly observed in this cohort of Filipino patients in our study who stayed longer in the hospital 70–110 days owing to their late sputum conversion when compared with their fellow non-diabetic patients 55–90 days. It is likely owing to altered or impaired immune system response in diabetic patients. None of the diabetic Filipino patients had multi-drug resistant TB, except one diabetic male patient who was reported resistant only to INH at 69 days of treatment. All Filipino diabetic patients in this study were males; none of the Filipino females had diabetes.

Conclusion

Filipino patients in this study showed that there was a high prevalence of diabetes among Filipino male patients, and there is a correlation between diabetes and TB. This combination affects the response and outcome of anti-TB treatment. These findings are in agreement with the current literature on the correlation of diabetes and TB. Clinicians treating patients with diabetes and presenting with respiratory symptoms should have a high index of suspicion for TB.

In Saudi Arabia the prevalence of diabetes is 23.7%, which is quite high, along with a very high incidence of childhood obesity. Preventing obesity, which is a risk factor for developing diabetes, will help to reduce the future burden of TB.

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